



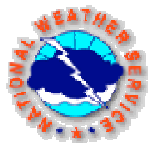
Quality Control of satellite radiances

- Purpose: To eliminate data which cannot be properly simulated or used -- Not just to eliminate observations with large observational errors.
- Single “bad” observation has more negatives than the positives from a lot of “good” ones.
- Multi-stage



Quality control – filtering of data

- Selection of observations.
 - HIRS -- Every 20th FOV + Cosine filter for latitudes greater than 30°. Profile used chosen based on location over open ocean and how likely it is to pass window check.
 - MSU – All used except first and last scan positions.
 - AMSU-A – Every 4th profile
 - AMSU-B – Every 12th profile
 - GOES – Every 3rd 5x5 box.



Quality control – Initial channel rejections

- Channels which at this time are not used.
 - HIRS
 - Channel 1 – Too much signal above top of model
 - Channels 16, 17 – Inadequate radiative transfer
 - Channels 18, 19 – Solar reflection
 - MSU – Channel 1 Surface emissivity (used for Q.C.)
 - AMSU-A
 - Channels 11-14 – Too much signal above top of model
 - AMSU-B – All used
 - GOES – Channels 16-18 see HIRS



Quality control – HIRS gross window check

- Linear regression simulation of SST based on channels 8 and 10.
- Differences greater than 8 degrees → channels 4-11, 13-15 eliminated.



Quality control – Basic rejections based on underlying surface

- Transition regions between land – sea – ice – snow.
 - No HIRS Channels 5-11, 13-15
 - No MSU Channels 1-2
 - No AMSU-A Channels 1-6, 15
 - No AMSU-B
 - No GOES



Quality control – Basic rejections based on underlying surface

- Land Surface and Sea Ice
 - No HIRS Channels 5-11, 13-15
 - No MSU Channels 1-2
 - No AMSU-A Channels 1-5, 15
 - No AMSU-B
 - No GOES



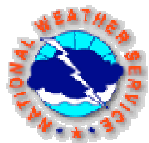
Quality control – MSU

- $|Ch1 - Ch1 \text{ (simulated and Bias corrected)}|$
 $= |(ch1diff)| > 5$. Channel 2 eliminated



Quality control – MSU (cont.)

- Surface height > 2000 . Channel 2 eliminated.
- Model and high resolution topography different channel 2 down weighted.
- Sensitivity to surface over land – channel eliminated.
- Modified 3 sigma check – channel by channel
 - Tighter in tropics, over land and where surface height differences large.



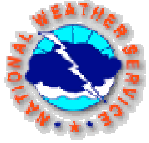
Quality control – AMSU-A

- Scattering index $-5. > 10$. Eliminates channels 1-6, 15.
- Cloud liquid water estimate $> .3$ eliminates channels 1-5, 15.
- Based on emissivity change necessary to fit radiances channels 1-5, 15 eliminated if over threshold for channels 1, 2 or 3.
- Channels 1-6, 15 down weighted based scattering index and cloud liquid water estimate.



Quality control – AMSU-A (cont.)

- Inability to fit channel 6 or channel 4 eliminates channels 1-6,15 or 1-5,15 respectively.
- Model and high resolution topography different, channels 1-5,15 down weighted.
- Sensitivity to surface over land – channel eliminated.
- Modified 3 sigma check – channel by channel
 - Tighter in tropics, over land and where surface height differences large.



Quality control – AMSU-B

- Scattering index and $|ch1diff|$ based quality control. Eliminates all channels.
- Channels down weighted based on scattering index and $|ch1diff|$.
- Modified 3 sigma check – channel by channel
 - Tighter in tropics, over land and where surface height differences large.



Quality control – HIRS

- $\text{Ch4} - \text{Ch4 (simulated and Bias corrected)} (\text{ch4diff}) < -20$. – All channels eliminated
- $\text{Ch4diff} < -1$. – Channels 3-15 eliminated.
- $|\text{Ch4diff}| > 1$. and $|\text{ch5diff}| > 1$. Channels 4-15 eliminated.
- $|\text{Ch8diff}| > 1$. Channels 5-11, 13-15 eliminated.
- $\text{Ch12diff} < 10$. Channels 4-15 eliminated.



Quality control – HIRS (cont.)

- Surface height > 2000 . Channels 4 and 12 eliminated.
- Solar zenith angle < 60 . Channels 13-15 eliminated.
- Model and high resolution topography different observation downweighted.
- Sensitivity to surface over land – channel eliminated.
- Modified 3 sigma check – channel by channel
 - Tighter in tropics, over land and where surface height differences large.